

NAV24 - PLATING

<u>SECTION I - Procedure:</u>		
A 1.	Identify the drawing; specification or document invokes the requirements for plating. Specify:	
A 2	a. Does a written detailed procedure exist and is it utilized for the plating process? Identify procedure number and revision:	___ Yes ___ No ___ N/A
	b. Are procedures readily available?	___ Yes ___ No ___ N/A
A 3	a. Is the procedure approved by the Customer? List Reference Approval Number, if applicable:	___ Yes ___ No ___ N/A
	b. Does the procedure require review/approval by the government?	___ Yes ___ No ___ N/A
A 4.	Are procedures/work instructions adequate for control of:	
	a. (Proper Equipment), etc.	___ Sat ___ Unsat ___ N/A
	b. (Proper Materials), etc.	___ Sat ___ Unsat ___ N/A
	c. Temperature monitoring - preheat, spraying temp, cooling, etc	___ Sat ___ Unsat ___ N/A
	d. Methods for masking areas	___ Sat ___ Unsat ___ N/A
	e. Pressure and flow settings	___ Sat ___ Unsat ___ N/A
	f. Preparation of Basis material.	___ Sat ___ Unsat ___ N/A
	g. Rate of application/time and plating bath	___ Sat ___ Unsat ___ N/A
	h. Inspection process	___ Sat ___ Unsat ___ N/A

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	i. Test specimens/coupons (when required)	___ Sat ___ Unsat ___ N/A		
	j. Sample sizes	___ Sat ___ Unsat ___ N/A		
	k. Make up and operating ranges of solutions	___ Sat ___ Unsat ___ N/A		
	l. Operating temperature of solutions	___ Sat ___ Unsat ___ N/A		
	m. Frequency of solution analysis	___ Sat ___ Unsat ___ N/A		
	n. Voltage/Amperage ranges (current densities) where applicable.	___ Sat ___ Unsat ___ N/A		
	o. Frequency of calibrating temperatures indicators, meters oven, etc. and accuracy required.	___ Sat ___ Unsat ___ N/A		
	p. Operational controls for cleaning, plating, baking, etc. (e.g. flowchart, traveler, router)	___ Sat ___ Unsat ___ N/A		
	q. Records to be maintained	___ Sat ___ Unsat ___ N/A		
A 5.	Does procedure include system for identification of inspection status on parts and documentation? (E.g. inspection stamp)	___ Sat ___ Unsat ___ N/A		
<u>SECTION II - Record Review</u>				
A 6.	Identify inspection methods used to verify conformance with procedures and standards	___ Sat ___ Unsat ___ N/A		
	<table border="1"> <tr> <td> * Visual ____ * Adhesion Test ____ * Hardness ____ * Thickness ____ * Other (list) _____ </td> <td> Mechanical Test ____ Surface Finish ____ Nondestructive Test ____ Other Destructive Tests ____ </td> </tr> </table>	* Visual ____ * Adhesion Test ____ * Hardness ____ * Thickness ____ * Other (list) _____	Mechanical Test ____ Surface Finish ____ Nondestructive Test ____ Other Destructive Tests ____	
* Visual ____ * Adhesion Test ____ * Hardness ____ * Thickness ____ * Other (list) _____	Mechanical Test ____ Surface Finish ____ Nondestructive Test ____ Other Destructive Tests ____			
A 7.	What inspection documents exist and are they maintained to confirm inspection process was performed?	___ Yes ___ No		
	a. Are inspection documents properly completed and maintained?	___ Yes ___ No		
	b. Review and record number of samples: _____	___ Yes ___ No		
A 8.	Is traceability maintained for material, which has been plated?	___ Yes ___ No		
A 9.	Is inspection data reviewed and accepted by qualified personnel?	___ Yes ___ No		

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A 10.	Are all tools, gages, meters, utilized for monitoring and/or inspection a part of the manufacturer's calibration program?	___Yes ___No ___N/A
A 11.	Are certifications for raw materials used in plating process reviewed for acceptance and maintained on file for review?	___Yes ___No ___N/A
A 12.	Verify prohibition of reclaimed material as may be required.	___Yes ___No ___N/A
A 13.	Adequate inspection work records are maintained.	___Yes ___No ___N/A
A 14.	The shop traveler and work records can be traced to the inspection personnel.	___Yes ___No ___N/A
<u>SECTION III - OBSERVATION OF PLATING PROCESS</u> Detailed observation of platers (complete one section for each plater observed). NOTE: if determined to be N/A, provide explanation.		___Sat ___Unsat
A 15.	Identify process observed. Specify class and type and/or grade.	___Sat ___Unsat
	a. Plater identification:(name, badge or clock #, shift)	
	b. Basis material(s) being welded.	
	c. Identify plating material.	
	d. Is the plater qualified for observed plating procedure?	___Sat ___Unsat ___N/A
	e. Is the plater familiar with details of the procedure?	___Sat ___Unsat ___N/A
	f. Procedure number:	
	g. Is it readily available to the plater and inspector?	___Yes ___No
A 16.	Are there adequate methods of segregating accepted and rejected materials in use?	___Yes ___No
A 17.	Tanks are placarded with solutions they contain and the operating parameters.	___Yes ___No

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A 18.	. Solution tanks operated at elevated temperatures are equipped with temperature indicating devices.	___Yes ___No
A 19.	Solutions requiring agitation are equipped with acceptable devices to accomplish this requirement.	___Yes ___No
A 20.	Ammeters, voltmeters, thermometers, are "stickered" to indicate calibration next due date.	___Yes ___No
A 21.	Clocks and/or timers are available where applicable.	___Yes ___No
A. 22.	Cleanliness	___Yes ___No
	a. Are pieces to be plated cleaned prior to process.	___Yes ___No
	b. List methods and materials used, if applicable.	___Yes ___No
	c. Is cleanliness maintained prior to plating?	___Yes ___No
A 23.	Rinse tanks are as follows:	___Yes ___No
	a. Free of contamination detrimental to the process	___Yes ___No
	b. Provide for separate rinses following acid and caustic solutions.	___Yes ___No
A 24.	The supplier has thickness measuring equipment available. Identify:	___Yes ___No
A 25.	The thickness measuring equipment is properly calibrated. a. What frequency? _____ Last calibration date _____	___Yes ___No
A 26.	Verify test coupons are processed with production material as required by the specification and they are properly identified.	___Sat ___Unsat ___N/A
A 27.	Process, general - good practices:	___Sat ___Unsat ___N/A

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	a. Parts are visually examined prior to plating for material defects, dimensions (critical surfaces), heat treat condition, dissimilar metals, presence of residual stresses, etc	___ Sat ___ Unsat ___ N/A
	b. Parts are visually examined after removal from processing solutions for copper immersion products, non-soluble smuts, pitting, excessively etched surfaces, etc.	___ Sat ___ Unsat ___ N/A
	c. Parts visually examined for a water break free surface before subsequent processing.	___ Sat ___ Unsat ___ N/A
	c. Wiping and cleaning clothes are checked for grease, oil, etc., content.	___ Sat ___ Unsat ___ N/A
A 28.	A certified stress relieve/bake oven is available meeting the following requirements:	___ Sat ___ Unsat ___ N/A
	a. Uniformity survey conducted at specified frequency.	___ Sat ___ Unsat ___ N/A
	b. Accurate at the temperature used to specified tolerances.	___ Sat ___ Unsat ___ N/A
	What range - Min _____ Max _____	
	c. Equipped with a recording chart that meets specified degrees per inch.	___ Sat ___ Unsat ___ N/A
	d. Control equipment is periodically calibrated and maintained. What frequency?	___ Sat ___ Unsat ___ N/A
	d. Is the stress relief/baking accomplished within specified time?	___ Sat ___ Unsat ___ N/A
	f. Are the parts held in over for specified time?	___ Sat ___ Unsat ___ N/A
A 29.	Housekeeping - Good Practices	___ Sat ___ Unsat ___ N/A
	a. Finishing tanks, electrical equipment, bus bars, and electrodes are relatively free of corrosion.	___ Sat ___ Unsat ___ N/A
	b. Excessive materials are not allowed in finishing area.	___ Sat ___ Unsat ___ N/A
	c. Chemicals and acids are stored in an area separate from finishing area.	___ Sat ___ Unsat ___ N/A

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	e. Safety precautions are in practice, i.e. proper ventilation, personnel and parts.	___ Sat ___ Unsat ___ N/A
	e. Tanks, such as anodize, chrome, hot alkaline cleaners, hot deoxidizers, etc., are equipped with exhaust systems.	___ Sat ___ Unsat ___ N/A
A 30.	Adequate cleaning facilities are available and in use.	___ Sat ___ Unsat ___ N/A
A 31.	Equipment is constructed and arranged to permit a uniform and controlled operation.	___ Sat ___ Unsat ___ N/A
	a. Sufficient working area has been allocated.	___ Sat ___ Unsat ___ N/A
	b. Adequate fire protection devices are maintained and readily available for use.	___ Sat ___ Unsat ___ N/A
A 32.	Packaging and Shipping:	
	a. Is adequate protection taken to prevent damage in shipment? (Internal and external)	___ Sat ___ Unsat ___ N/A
	b. Is adequate control provided to assure that packaging, marking and documentation is in accordance with applicable requirements?	___ Sat ___ Unsat ___ N/A

General instructions for performing plating process audits:

A. Determine the types of materials that are plated and the types of plating/coating that are performed at the supplier.

B. Review a cross section of open and closed orders to measure historical performance. Closed orders should span a two to three year period if possible

C. Choose a cross section of materials. E.g. type I materials such as 304 or 316 stainless, Type III nickel based alloys with particular attention to X-750 which has special baking requirements, type IV carbon and low alloy steels such as higher strength 4140/4340, type VI materials such as XM-13, 17-4PH, A286. A sample review of each of these materials is appropriate.

D. Check requirements passed down to the plater in the purchase order from the parts supplier to the plater. Does the purchase order provide specific guidance, such as:

- 1) Plating, examination and return of coupons
- 2) Pre-plating stress relief for higher strength materials
- 3) Post bake performed when required and performed at the right length of time
- 4) Embrittlement relief testing

5) Review the plater certification versus the format requirements of the specification. Check to ensure that information is completed consistent with expectations (e.g. is a post-bake heat treat is required, is a temperature and bake time documented. Are coupons available (not required to retain but many vendors do as objective evidence.)

6) Perform similar compliance reviews on a sample basis for other types of plating. Read the specification carefully and understand all the requirements and when they should be complied with.

Additional Comments/Concerns: